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S/N 09/866,180

PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MATSUMOTO	Examiner:	M. RUTHKOSKY
Serial No.:	09/866,180	Group Art Unit:	1745
Filed:	MAY 25, 2001	Docket No.:	13041.14US01
Title:	SPIRALLY ROLLED ELECTRODES WITH SEPARATOR AND THE BATTERIES THEREWITH		

CERTIFICATE UNDER 37 CFR 1.6(d):

I hereby certify that this paper is being transmitted by facsimile to the U.S. Patent and Trademark Office on

11-2-04

By: 
Name: Kay Fahlund

DECLARATION UNDER 37 CFR § 1.132

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

I, Isao Matsumoto, declare and state the following:

1. I am a resident of Osaka, Japan. I am the inventor of U.S. patent application number 09/866,180 titled "SPIRALLY ROLLED ELECTRODES WITH SEPARATOR AND THE BATTERIES THEREWITH."

2. I constructed electrodes in accordance with embodiment 1 of the specification. Specifically, 50 sheets of an electrode plate for a positive electrode were prepared that were 400 μ m thick, 40mm wide, and 465mm in length. The electrode plate sheets were divided into two by a heretofore known cutting device to make 100 positive electrode plates that were 400 μ m thick, 40mm wide, and 230mm long. 50 sheets of an electrode plate for a negative electrode plate were prepared that were 250 μ m thick, 40mm wide, and 580mm in length. Then, the

positive electrode plates were sorted into 8 groups by weight. An average weight of the total weights was obtained. Then 50 pairs of positive electrode plates were prepared by selecting combinations of light electrode plates and heavy electrode plates so that the weight of each pair was almost the average weight. Secondary batteries were then prepared with a known sulfonated polypropylene nonwoven fabric (with a thickness of about 90 μ m) as a separator and a combination of said positive and said negative electrode plates, 50 cells of c-size (which is 25mm in diameter, 50mm high), with the space between the two positive electrode plates of each cell equal to 5mm.

The battery capacities of the 50 batteries were then measured. Specifically, after repeating charge (0.1Cx120%) and discharge (0.2C, up to 1V) cycles at a temperature of 20°C three times, the measurement of the battery capacity (0.2C discharge capacity) was carried out by discharging up to 1.0V at 0.2C after charging (0.1Cx150%). The result is shown in Fig. 1. In Fig. 1, the vertical axis represents the battery capacity (mAh) and the horizontal axis represents the number of cells.

As seen in the bar chart in Figure 1, there were 49 cells having a capacity of 4200-4250mAh and 1 cell having a capacity of 4150-4200mAh. To be more precise, the average capacity of all 50 cells was 4223mAh, the maximum value was 4241mAh and the minimum value was 4198mAh. The capacities of all the cells stayed within 1.0% of the average.

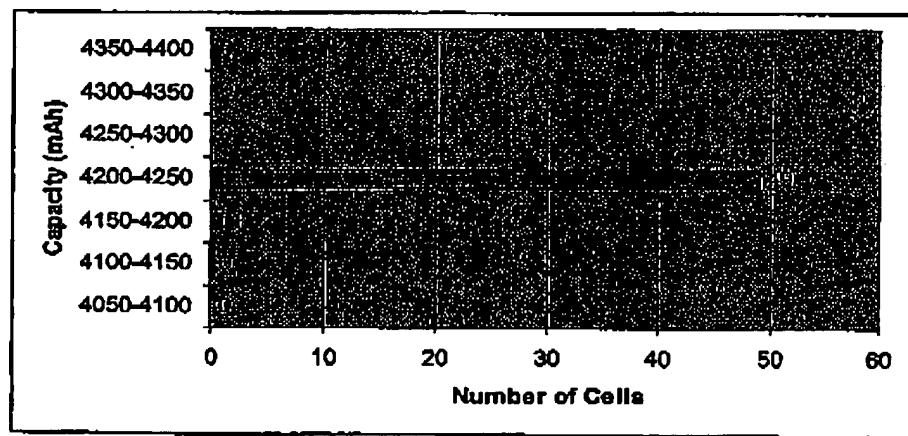


Figure 1

3. I also constructed cells in a manner that represents the disclosures of Kitoh (U.S. 6,258,487) and Nagaura (U.S. 5,534,369). 100 positive electrode plates were initially prepared by the same method as in the previous example. However, in contrast to the procedure above, 50 pairs of positive electrode plates were made by randomly selecting any two plates. As Kitoh does not disclose selecting combinations of light electrode plates and heavy electrode plates so that the weight of each pair is approximately the average weight of all positive electrodes, randomly pairing positive electrode plates fairly represents the methods of Kitoh and Nagaura. Secondary batteries were then prepared with a known sulfonated polypropylene nonwoven fabric (with a thickness of about 90 μ m) as a separator and a combination of said positive and said negative electrode plates, 50 cells of c-size (which is 25mm in diameter, 50mm high), with the space between the two positive electrode plates of each cell equal to 5mm.

The battery capacities of the 50 batteries were then measured. Specifically, after repeating charge (0.1Cx120%) and discharge (0.2C, up to 1V) cycles at a temperature of 20°C three times, the measurement of the battery capacity (0.2C discharge capacity) was carried out by discharging up to 1.0V at 0.2C after charging (0.1Cx150%). The result is shown in Fig. 2. In Fig. 2, the vertical axis represents the battery capacity (mAh) and the horizontal axis represents the number of cells.

As seen in the bar chart in Figure 2, two cells had a capacity between 4050-4100mAh, three cells had a capacity between 4100-4150mAh, five cells had a capacity between 4150-4200mAh, 18 cells had a capacity between 4200-4250, 16 cells had a capacity between 4250-4300mAh, 4 cells had a capacity between 4300-4350mAh, and two cells had a capacity between 4350-4400mAh. The average capacity of all 50 cells was 4235mAh, the maximum value was 4392mAh and the minimum value was 4055mAh. The individual capacities varied up to 4.25% from the average capacity of the batteries.

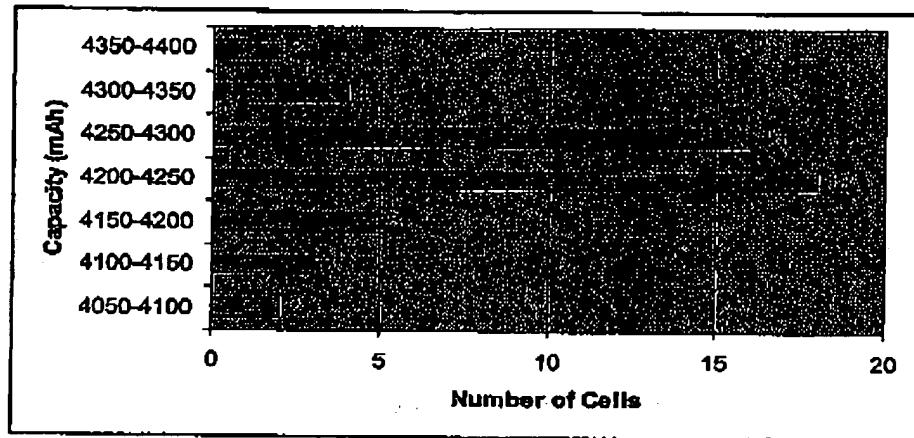


Figure 2.

4. Therefore, I conclude that the electrodes described in the present claims of this patent application are different from the electrodes of Kitoh and Nagaura.

5. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Isao Matsumoto Nov. 2nd, 2004
Isao Matsumoto \ Date

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